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Four visions, three dimensions: the future of 3D printing

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Abstract

Chances are you've heard about 3D printing – or additive manufacturing as it's otherwise known: a process that turns computer-aided designs into three-dimensional, real-world objects with a range of uses, from a range of materials and on a range of scales. But you've probably heard little in terms of the social impact that 3D printing and its associated technologies will likely have. Those possible impacts are exactly what we're investigating at Lancaster University and the University of Wollongong. We've identified four potential scenarios that could eventuate in a world that embraces 3D printing and, crucially, how those scenarios could affect everyday life.

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Four visions, three dimensions: the future of 3D printing

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We have the technology … but have we discussed its possible impacts? fdecomite

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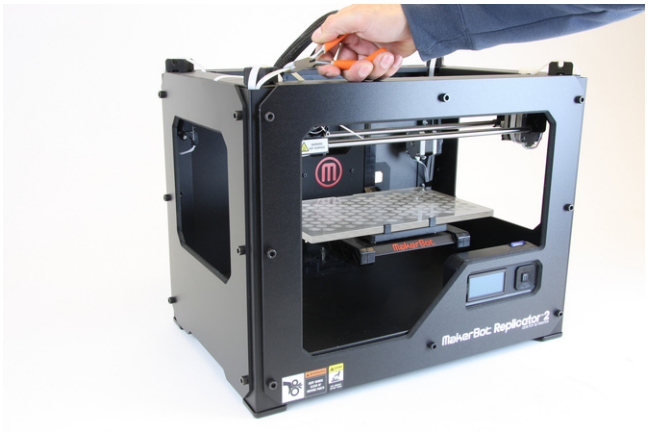
Where we're at

Walking around the 3D Printshow 2012 in London last month, the hype around 3D printing technology was palpable.

The first stall in view was MakerBot's, and the company's CEO and founder Bre Pettis was busy spruiking their Replicator 2 – Time Magazine's Best Invention of 2012.



Unboxing the MakerBot Replicator 2. Creative Tools

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But it was in the other stalls out the back, populated by artists, entrepreneurs and researchers, where this innovation could be seen doing really interesting things.

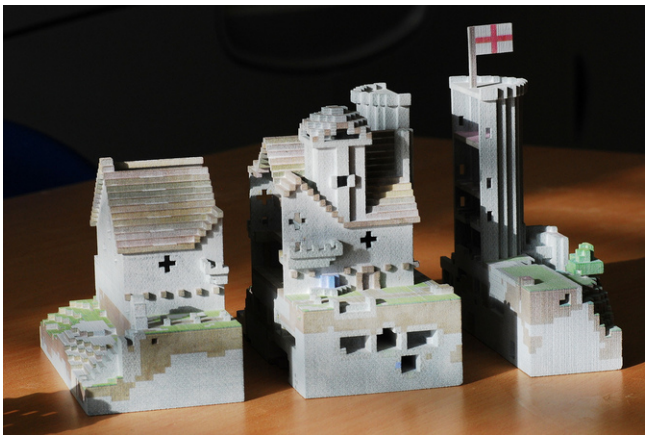
In those stalls there were different intimations of the futures we have imagined in our project at Lancaster University.

In one corner there were a couple of children playing the game Minecraft. Their mother explained that they were actually creating 3D designs within the game (in between foraging for food and fighting spiders).

The game players design objects from cube-shaped blocks in the same way they might design in-game houses and caves.

A clever piece of software called Printcraft uploads designs made in Minecraft to a server, which automatically converts the designs into 3D-printable files. Then the player simply prints the design out on an adjacent 3D printer, in this case a MakerBot.

At another company's stall a salesperson (the inventor was her dad) claimed her printer could print different colours at the same time – something that hasn't been possible with 3D printers until now.



Printing 3D models from Minecraft is child's play. post-apocalyptic research institute

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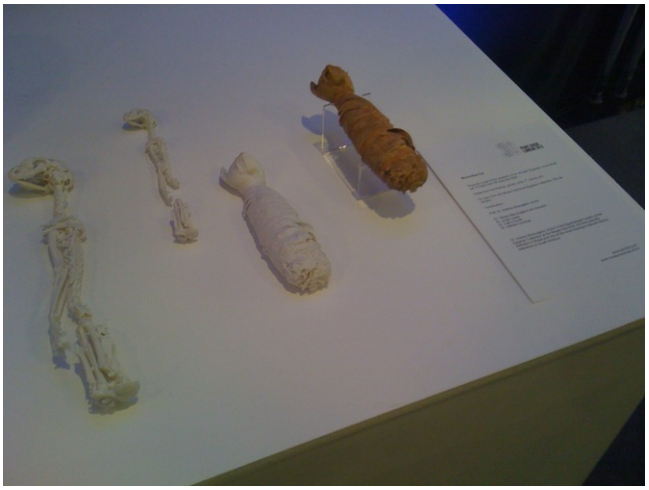
Next to this one there was a 3D printer with a handle so it could be carried around – both printers drew on the open-source Reprap design.

An adjacent stall was a bit different in that it didn't feature 3D printers. Instead, a team of designers and marketing gurus offered their 3D printing expertise for small product runs and trial inventions.

Further along there was a scale model of the Urbee 3D-printed car. There was also a chain-mail shirt made of tiny steel links, amazingly assembled by an expensive laser sintering printer.

And most impressively there was a row of 3D-printed mummified animals from an archaeological project rendered in near-perfect detail down to the bandages, as per the photo below:



3D prints of mummified animals at the 3D Printshow 2012
Thomas Birtchnell

Where we're going

Our research has seen us explore four different social futures around 3D printing.

They were shaped by how corporate this new industrial revolution will be and how much individuals will engage with the technology. In particular we were interested in how 3D printing might influence the transportation of objects and the travel of people.

In order to find out what futures might be, where 3D printing has significance (or not), we held a workshop with the Futures Company in London, and picked the brains of engineers, consultants, policymakers and designers. The four possible futures are below:

1. Home factories

Everyone has a 3D printer in their home sitting next to their paper printer and making plastic jewellery, kitchen utensils, toys, models, homework projects and non-critical replacement parts.

People in this future no longer derive as much satisfaction from shopping in the high street for cheap products and are printing much more "stuff", mostly made of plastic or resin.

2. Print shops

Manufacturing has "returned" to places such as the UK, the US and Australia.

Companies are integrating high-end 3D printers that print all sorts of exotic materials – from

steel and titanium to sandstone and carbon fibre – into their supply chains and retail outlets.

As a result there are efficiency gains in how objects are transported and where they are made. Aeroplane parts and car dashboards, for instance, are made locally and customised to order.

3. Fab labs

Groups of people work together on not-for-profit or subsidised printers provided with support services and technicians.

The main focus is not new markets but rather new communities that craft objects they intend to use for recreation or for trading and selling in specialist “maker fairs”.

These communities hinge on open-source technologies and co-production ethics, and generally people are still relying on a global production system for much of what they need.

4. The 3D bubble

The market bubble has burst as inflated expectations have caused 3D printing to be severely over-hyped.

Many small entrepreneurs have gone bust and multinational corporations have not renewed their product lines. Consumers are dissatisfied with the appearance and unreliability of 3D-printed objects and design software is too complicated to master.

In this fourth future, 3D printing is still being used by specialists for prototyping, preservation of collections and high-end bespoke accessories.

TheresaBurger

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Will any of these futures happen? As always, time will tell. But we should be discussing the potential social impacts now, before the future arrives.

In the meantime, as the 3D Printshow 2012 ably demonstrated, there are already many exciting and inspiring uses of this technology.